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1996-97 Final Report

I. Project Title: Establishing IPM Programs To Reduce Pesticide Use in Public Buildings"

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IV. Summary: This project has initiated the first IPM program for indoor pests undertaken by a NASA facility. Successful IPM programs for cockroaches, mice, and ants have been implemented in 6 pilot buildings representing over 300,000 square feet of building space. Both monitoring data and interviews with building occupants have documented that pest numbers have been reduced to negligible levels, and clients have expressed a high level of satisfaction with the program.

In addition to improved pest control, this IPM project has resulted in substantial reduction in pesticide use during the first year of the program. In the year prior to IPM program start-up (October 1994 to September 1995, approximately 4000 gallons of formulated pesticide (roughly 4000 gms active ingredient) were applied to approximately 20 to 30 buildings reporting pest problems at the NASA facility. In the first 14 months of the transition to IPM (October 1995 to December 1996), total applications dropped to approximately 500 gallons for all buildings reporting pest problems. This drop was attributed primarily to PCOs agreeing to shift to granular baits in place of liquid broadcast sprays for scheduled quarterly treatments to building perimeters. In addition, in the 6 pilot IPM buildings where all routine outdoor perimeter pesticide treatments were suspended and pest-proofing, sanitation improvements, and spot treatments with primarily insecticidal baits and gels were implemented indoors, less than 4 gallons (equivalent) of formulated pesticides were applied, compared to approximately 180 gallons in the year prior to IPM.

The very positive results of the pilot IPM program to date, including cost-effectiveness, has led the NASA/Ames contracts office to incorporate IPM components into the new maintenance contract specifications currently

being sent out to bid. All buildings at the NASA / Ames facility will be serviced with IPM methods by the successful bidder for the new contract.

An extensive article on the methodology used to achieve these results was published in the February 1997 issue of *The IPM Practitioner* (copy attached).

V. Results and Discussion:

Objective 1. Form an IPM innovator group at a large public institution and establish program objectives and methods.

We formed an IPM innovator group comprised of the following participants:

a. Operations managers for BAMSI, Inc. which is the prime contractor for all maintenance, custodial, and pest control services for the NASA / Ames Research Center and other tenants at Moffett Field, CA;

b. The NASA safety and environmental monitors who oversee the work performed by BAMSI and their subcontractors;

c. A-Pro Pest Control, which as a sub-contractor to BAMSI supplies structural pest control services for the Moffett facility;

d. The Bio-Integral Resource Center and Rodex Pest Control who are responsible for designing the IPM program, training BAMSI and A-Pro Pest Control staff, and guiding implementation of the IPM program

e. The NASA / Ames Environmental Committee also supports this program and is available for consultation and support when needed.

The IPM team established program objectives, procedures, and a communication system to keep all parties concerned about pest control informed about IPM program activities and issues. We have made substantial progress to date. Obstacles are being handled as they occur, and will be discussed in this report.

The IPM decision-making process being put into place at Moffett Field differs substantially from the conventional pest control service approach which focuses primarily on treating pest organisms (symptoms) primarily with pesticides. IPM focuses primarily on reducing pest habitat, food sources, and other conditions conducive to pests (causes), and uses customer education, physical pest-proofing of buildings, improved sanitation, and other non-chemical methods as primary management tools, with low-toxic pesticides in low-exposure formulations or application methods when needed.

Making the transition to an IPM approach requires a pest control company to substantially rethink its methodology, type and level of customer service, market niche, pricing, and a host of other business decisions. Incentives are needed. In recognition that A-Pro Pest Control is being asked to respond to a change in the scope of work it originally contracted for in order to receive training in and to deliver IPM services, additional funds were added to A-Pro Pest Control's contract to help underwrite their labor and other costs incurred for IPM training and other and other costs associated with IPM startup.

The IPM program participants also needed to take cognizance of the various lines of authority and oversight in place at Moffett Field, a government facility. This impacts the IPM program because new products and procedures must receive prior approval from the prime contractor (BAMSI) as well as from their government monitors before new components can be incorporated into the IPM program. This can slow the pace of change, but encourages good communication and accountability.

Objective 2. Document the pre-IPM pest control program, including pesticide use figures, and costs.

Six buildings with a history of problems with argentine ants, cockroaches, and mice have been designated for the pilot IPM program. The pre-IPM pest control program at these sites consisted of routine monthly or quarterly pesticide applications plus responses within 24-hours to "trouble calls" about pests phoned in by facility safety representatives (FSRs) located in each building. Most insect trouble calls resulted in pesticide applications with organophosphates, pyrethrins, or synthetic pyrethroid products. Rodents such as mice were trapped with snap-traps (use of glueboards and poison baits are not permitted at Moffett Field except in unusual situations).

Prior to the IPM program, the NASA safety office had issued policies requiring prior approval of any pesticide or other pest control product before it can be used at Moffett Field. The policies also restricted indoor or outdoor application of volatile pesticides to non-working hours (evenings or weekends) when buildings were unoccupied. A notice of intent to apply pesticides must be posted 48 hours in advance of any treatment involving a pesticide that can volitalize in the air. The pest control company found this 48-hour pre-notification very challenging to work with since aerosol formulations of pesticides are primary tools when they make a service call. Exceptions to the pre-notification can be granted when non-volatile formulations such as granular baits or gels of low-toxic pesticides or non-chemical methods are used. Since these latter approaches are the primary thrust of the IPM program, the NASA pesticide restrictions could be construed as an incentive to adopt IPM.

A computerized record-keeping system for the IPM program, and data for all IPM pest control activities including pesticide applications and amounts was tracked. This data was used as the baseline for this multi-year program.

Objective 3. Design an IPM monitoring and record-keeping system for the pilot program.

German and American cockroaches are chronic indoor pest problems at Moffett Field. A multi-component monitoring program for these pests has been designed and implemented. The monitoring protocol includes (a) initial inspection; (b) placement of sticky monitoring traps and bi-weekly analysis of trap catches; (c) preparation of requests for pest proofing and sanitation improvements; (d) treatment when the action threshold is reached; (e) evaluation of effectiveness of chemical and non-chemical treatments; (f) education of clients.

At the building with the most severe german cockroach problem (a food handling establishment), the IPM program has accomplished the following to date. Using trap catches and visual inspections, an initial treatment action level of an average of 2 roaches per trap was established. This level is currently being tested and appears to be adequate except where roach hot-spots occur. This contingency is readily evident on the data sheets when a disproportionate number of roach catches are located in a few traps. This triggers a visual inspection and appropriate action. All monitoring data is entered into a computerized spreadsheet which calculates the average number of roaches per trap for each site monitored.

A complete set of record keeping forms designed to facilitate rapid data collection and ease of analysis has been prepared. These forms consist of floor plan diagrams for each floor of each building being monitored. Trap locations and numbers plus other relevant information are noted on the floor plans. Trap data is written on a tabular sheet on the reverse side of the diagram. These forms are carried on a clipboard, then transferred to data processing personnel for computer entry. The computer data is reviewed monthly for pest trends, etc.

Other monitoring forms prepared include: initial inspection form; request for pest proofing; and sanitation improvement alert. Other forms record data on pest treatment actions, type and quantities of pesticides or non-chemical materials, and outcomes of pest control activities.

Objective 4. Conduct hands-on IPM training for PCOs and building managers.

Hands-on IPM training and written treatment protocols were provided to BAMSI and A-Pro Pest Control personnel by IPM specialists from BIRC and

Rodex Pest Control. Topics covered included: recording and interpreting monitoring data; determining treatment action thresholds for target pests; pest-proofing buildings to prevent future pest problems; using physical, mechanical, and biological treatment methods; integrating least-toxic chemical methods when needed; pesticide application methods to reduce human exposure to toxic materials; communication methods with building occupants to facilitate pest prevention; and methods for evaluating program results.

At first, PCOs were somewhat skeptical about the value of monitoring. However, as they learned the monitoring techniques and put them into practice, they gradually saw how data collection made it possible to pinpoint pest locations, reveal pest population trends, and track efficacy of the management techniques and products. By the end of the first year, monitoring was a fully functional component of the pilot IPM programs, and was key to the significant reduction in pesticide use achieved by this project. All other components of the IPM program introduced into the training program were also adopted.

Objective 5. Initiate Phase 1 Implementation of the IPM Program.

Primary focus of Phase 1 has been cockroach management at a cafeteria building and an office building, mouse management at a commissary building, and ant management at three office buildings. The IPM program for implemented for cockroaches illustrates the program approach and achievements. It replaces a program comprised primarily of pesticide applications in response to frequent trouble calls from cafeteria management.

Achievements include: (a) bi-weekly monitoring with sticky traps; (b) complete cleaning of cafeteria equipment, walls, etc. by professional cleaning crew followed by sanitation education of staff and improved sanitation management; (c) pest proofing (caulking) to remove cockroach harborage; (d) application of low-toxic boric acid and silica aerogel insecticides to all wall voids; (e) spot-treatments with low-toxic bait stations (hydramethylnon) and an insect growth regulator (hydroprene) with no known impact on humans. As of the end of the first year of this program, monitoring data and visual inspections indicate that roaches are at insignificant levels in this building. Roach populations have remained below the treatment threshold (an average of 1 roach per trap) for the last six months. The cafeteria manager and staff are highly satisfied with the IPM program.

The mouse IPM program also has been successful in keeping mouse populations as low levels even though the building is in such poor repair that reinvasions by mice is difficult to prevent.

The most dramatic outcome in the past six months has been the success of the IPM program for Argentine ants. For years, this insect has been the most widespread and difficult pest problem at the Moffett facility. Introduction of a monitoring program and an experimental, very low toxic boric acid bait station place outdoors near ant entry points into buildings, has prevented ants from entering the pilot IPM buildings. The next phase of the ant IPM program is focusing on introducing IPM methods to reduce populations of honeydew-producing insects on landscape vegetation. Ants feed on the honeydew. By removing the sources of the honeydew near buildings, ant colonies are likely to move to other sites away from buildings in search of alternate food. This will further protect buildings from infestation by ants.

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D. Communication/Educational Outreach

A briefing for top level personnel from BAMSI and NASA/Ames government monitors, Lyn Hawkins from DPR and Jay Suslow from the San Francisco Agricultural Commissioners Office was held during the first 6 months of this project. An extensive article on the outcomes of the first year of this project was published in the February, 1997 issue of *The IPM Practitioner*. A detailed presentation on the project was made to 100 pest control operators at a meeting of the Pesticide Applicators Professional Association in Stockton on March 6, 1997.